

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number
WO 2003/089161 A3

(51) International Patent Classification⁷: **E21B 19/06**

(21) International Application Number:
PCT/US2003/010144

(22) International Filing Date: 31 March 2003 (31.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/372,632 15 April 2002 (15.04.2002) US

(71) Applicant (for all designated States except US): **ENVEN-
TURE GLOBAL TECHNOLOGY** [US/US]; 16200 A Park
Row, Houston, TX 77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **COSTA, Scott**

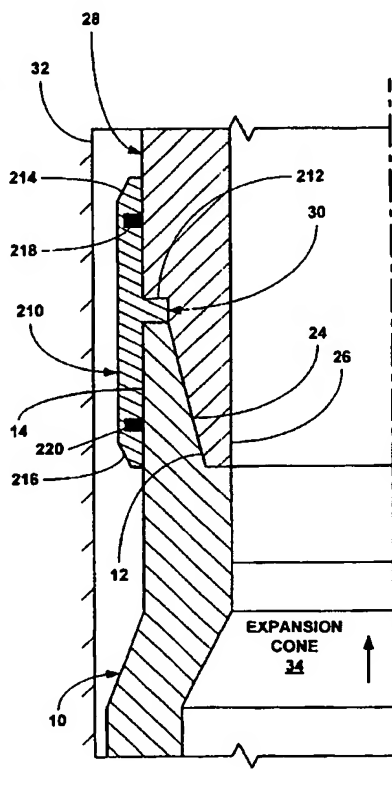
[US/US]; 2011 Willow Point, Kingwood, TX 77339
(US). **HOCKADAY, Joel** [US/US]; 17318 Ginger Fields
Lane, Tomball, TX 77375 (US). **WADDELL, Kevin,
K.** [US/US]; 11007 Sprucedale Court, Houston, TX
77070 (US). **RING, Lev** [RU/US]; 14126 Heatherhill
Place, Houston, TX 77077 (US). **BULLOCK, Michael**
[US/US]; 19827 Sky Country, Houston, TX 77094 (US).
COOK, Robert, Lance [US/US]; 934 Caswell Court,
Katy, TX 77450 (US). **KENDZIORA, Larry** [US/US];
6518 Williams School Court, Needville, TX 77461 (US).
BRISCO, David, Paul [US/US]; 405 Westridge Drive,
Duncan, OK 73533 (US). **JACKSON, Tance** [US/US];
7209 Ridgemoor Lane, Plano, TX 75025 (US).

(74) Agents: **MATTINGLY, Todd** et al.; Haynes and Boone,
LLP, 1000 Louisiana Street, Suite 4300, Houston, TX
77002-5012 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,

[Continued on next page]

(54) Title: **PROTECTIVE SLEEVE FOR THREADED CONNECTIONS FOR EXPANDABLE LINER HANGER**



(57) Abstract: A tubular sleeve (210) is coupled to and overlaps the threaded connection (12, 14) between a pair of adjacent tubular members (14, 16).

WO 2003/089161 A3



GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

Published:

— with international search report

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:

26 February 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/10144

A. CLASSIFICATION OF SUBJECT MATTER												
IPC(7) : E21B 19/16												
US CL : 166/380, 85.3, 309, 387, 72, 73.; 285/382.7, 398												
According to International Patent Classification (IPC) or to both national classification and IPC												
B. FIELDS SEARCHED												
Minimum documentation searched (classification system followed by classification symbols) U.S. : 166/380, 85.3, 309, 387, 72, 73, 187, 195, 206, 207, 212, 216, 217; 285/382.7, 398, 55, 388.1												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched None												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EAST												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
A	US 6,405,761A (SHIMIZU et al) 18 June 2002, see entire document	1-144										
A	US 5,971,443 A (NOEL et al) 26 October 1999, see entire document	1-144										
A	US 5,309,621 A (O'DONNELL et al) 10 May 1994, see entire document	1-144										
A	US 3,997,193 A (TSUDA et al) 14 December 1976, see entire document	1-144										
A	US 3,989,280 A (SCHWARZ) 02 November 1976, see entire document	1-144										
A	US3,834,742 A (MCPHILLIPS) 10 September 1974, see entire document	1-144										
A	US 3,579,805 A (KAST) 25 May 1971, see entire document	1-144										
A	US 2,647,847 A (BLACK et al) 04 August 1953, see entire document	1-144										
X	US 4,693,498 A (BAUGH et al) 15 September 1987, see Fig. 2a and 2b	64										
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.												
* Special categories of cited documents: <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention											
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone											
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art											
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family											
"P" document published prior to the international filing date but later than the priority date claimed												
Date of the actual completion of the international search 30 July 2003 (30.07.2003)		Date of mailing of the international search report 31 OCT 2003										
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230		Authorized officer Roger J. Schoeppel Telephone No. (703) 306-4180										

INTERNATIONAL SEARCH REPORT

PCT/US03/10144

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,275,556 A (KINNEY et al) 14 August 2001, see Fig. 3	64

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/10144

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

PCT/US03/10144

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I comprises the method of radially deforming a tubular with plastic deformation whereas Group II does not make such a deformation. Groups III and IV comprise using a tubular subjected to radial deforming and plastic deformation (in eight of the independent claims) in completing a geothermal energy well. The groups are further distinguished in whether a flanged sleeve is used in making up a tubular string, whether the flange is internal or external, whether the connecting tubes are threaded or not, inter alia such as whether or not seals are used in the connection.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

- I. Claims 1-63, comprising 5 independent claims, drawn to a "Method".
- II. Claims 64-127, comprising 5 independent claims, drawn to an "Apparatus".
- III. Claims 124-141, comprising 10 independent claims, drawn to a "Method and Apparatus for Extracting Geothermal Energy."
- IV. Claim 142, drawn to a "Method of Testing."